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(54) [Name of the invention]

Inorganic Fiber formed Body and Catalyst Converter

(57) [Abstract]

[Subject]

To suggest an inorganic fiber formed (molded) body that is improved so that at the time when it is used as a monolith support is easily attached onto the casing and also it stably fixes the monolith, and also to suggest a catalyst converter that advantageously uses the above inorganic fiber formed body.

[Solution measures]

The inorganic fiber formed body according to the present invention is formed a a first inorganic fiber mat and a second inorganic fiber mat are laminated as layers. The first inorganic fiber mat has a structure that is formed from a crystalline alumina fiber mat that is compressed in the direction of the thickness and an organic binder material; and the second inorganic fiber mat has a structure that is formed mainly from a mat formed from a ceramic fiber other than the above described, an inorganic expandable material and an organic binder material. Also, in the case of the catalyst converter according to the present invention, the above described inorganic fiber formed body is wrapped around the monolith (1) as a monolith support material (3).

[Range of the claims of the invention]

[Claim 1]

Inorganic fiber formed body characterized by the fact that it is an inorganic fiber formed body that is formed as a first inorganic fiber mat and a second inorganic fiber mat are laminated as layers, where the first inorganic fiber mat has a structure formed from a crystalline alumina fiber mat that is compressed in the direction of the thickness and an organic binder material that is homogeneously impregnated into the above described alumina fiber mat, and also that is eliminated by a thermal decomposition, and where the second inorganic fiber mat has a structure that is mainly formed from another ceramic fiber different than the above described and an organic binder material that is homogeneously impregnated into the above described alumina fiber mat, and also that is eliminated by a thermal decomposition, and where the ratio of the thickness of the first inorganic fiber mat relative to the thickness of the whole body of the inorganic fiber formed body is set to be in the range of 20 ~ 80 %.

[Claim 2]

Inorganic fiber formed body according to the above described Claim 1 of the present invention where the crystalline alumina fiber that forms the structure of the first inorganic fiber mat is a fiber with a mulite composition.

[Claim 3]

Inorganic fiber formed body according to the above described Claim 1 or Claim 2 of the present invention where the average fiber diameter of the crystalline alumina fiber that forms the structure of the first inorganic fiber mat is in the range of 3 ~ 8 microns, and also, the fiber length is in the range of 0.5 ~ 500 mm.

[Claim 4]

Catalyst converter characterized by the fact that it is a catalyst converter that has a structure formed from a monolith that is formed in a cylindrical shape and that supports a catalyst material used for the purification of the exhaust gases, a casing that is manufactured from metal that houses the above described monolith and also that is connected to the exhaust gas pipelines, and a monolith support material that is wrapped around the above described monolith and that is placed in the clearance between the monolith and the above described casing; where the above described monolith support material is the inorganic fiber formed material reported according to any of the above described claims 1 ~ 3 of the invention, and also, where the first inorganic fiber mat is placed at the side of the above described monolith.

[Detailed explanation of the present invention]

[0001]

[Technological sphere pertinent to the present invention]

The present invention is an invention about an inorganic fiber formed body and a catalyst converter. And in more details, the present invention is an invention about an inorganic fiber formed body that is used as a monolith support material for catalyst converters that are mainly used in automobiles, and it is easy to assemble and also a stable fixing of the monolith is obtained; and it is also an invention about the catalyst converter that uses the above described inorganic fiber formed body.

[0002]

[Previous technology]

The catalyst converter, as it is well known, is a device that by the use of precious metal catalyst eliminates carbon monoxide, hydrocarbons, nitrogen oxides etc., toxic components that are contained in the exhaust gases from the internal burning engines.

[0003]

In the report disclosed according to the Japanese Patent Application Laid Open Number Hei-Sei 1-240715, a catalyst converter has been reported that uses a monolith support material formed from inorganic fiber formed material. Regarding the above described inorganic fiber formed material, it is a material that has an expandable mat, that has a structure that is mainly formed from a ceramic fiber mat and an organic binder material that is homogeneously impregnated into the above described ceramic fiber mat, and also that is eliminated by a thermal decomposition, and where relative to that mat, an alumina fiber mat is stitch bonded by an organic thread, and a laminated layer body is formed. And it is a material that is designed so that the high temperature thermal deterioration of the thermally expandable mat is prevented by the alumina fiber mat.

[0004]

[Problems solved by the present invention]

However, in the case of the above described inorganic fiber formed body that is used as a monolith support material, because the alumina mat is bulky at the time of the assembly of the catalyst converter, there is the problem that it is stated that the attachment onto the casing is difficult. Not only that, but also, because of the difficulties in the adhesion of the alumina fiber mat relative to the thermally expandable mat, even if the stitch bonding by an organic thread is advantageously used, it is easy for the fibers to be damaged by the stitch bonding, and as a result from that, there is the problem that it has been stated that the supporting force relative to the monolith is decreased.

[0005]

Regarding the present invention, it is an invention that has taken into consideration the above described practical circumstances, and it is invention whose first goal is to suggest an inorganic fiber formed body that is improved so that at the time when it is used as a monolith support is easily attached onto the casing, and also to suggest a catalyst converter that advantageously uses the above inorganic fiber formed body. Also, the second goal of the present invention is to suggest an improved inorganic fiber formed body such that there is no fiber damage and that at the time when it is used as a monolith support it sufficiently demonstrates supporting force relative to the monolith, and the monolith fixing is stable, and also to suggest a catalyst converter that advantageously uses the above inorganic fiber formed body.

[0006]

[Measures in order to solve the problems]

Namely, regarding the first essential item according to the present invention, it consists of the following: it is an inorganic fiber formed body characterized by the fact that it is an inorganic fiber formed body that is formed as a first inorganic fiber mat and a second inorganic fiber mat are laminated as layers, where the first inorganic fiber mat has a structure formed from a crystalline alumina fiber mat that is compressed in the direction of the thickness and an organic binder material that is homogeneously impregnated into the above described alumina fiber mat, and also that is eliminated by a thermal decomposition, and where the second inorganic fiber mat has a structure that is mainly formed from another ceramic fiber different than the above described and an organic binder material that is homogeneously impregnated into the above described alumina fiber mat, and also that is eliminated by a thermal decomposition, and where the ratio of the thickness of the first inorganic fiber mat relative to the thickness of the whole body of the inorganic fiber formed body is set to be in the range of 20 ~ 80 %.

[0007]

Regarding the second essential element according to the present invention, it is contained in the following: a catalyst converter characterized by the fact that it is a catalyst converter that has a structure formed from a monolith that is formed in a cylindrical shape and that supports a catalyst material used for the purification of the exhaust gases, a casing that is manufactured from metal that houses the above described monolith and also that is connected to the exhaust gas pipelines, and a monolith support material that is wrapped around the above described monolith and that is placed in the clearance between the monolith and the above described casing; where the above described monolith support material is the inorganic fiber formed material reported according to any of the above described claims 1 ~ 3 of the invention, and also, where the first inorganic fiber mat is placed at the side of the above described monolith.

[0008]

[Conditions of the practical implementation of the present invention]

The conditions for the practical implementation of the present invention will be explained based on the figures presented. Figure 1, is a three dimensional view diagram in an assembly state showing the structure of the catalyst converter. Figure 2 is a three dimensional view diagram showing the wrapping outline of the monolith support material relative to the monolith. Figure 3 is a three dimensional view diagram showing part of the monolith support material that has a structure that is obtained from an inorganic fiber formed body.

[0009]

Regarding the inorganic fiber formed body according to the present invention, it has a structure that is formed as the first inorganic fiber mat and the second inorganic fiber mat are laminated as layers. And then, as the first inorganic fiber mat an inorganic fiber mat is used that has a structure that is formed from a crystalline alumina fiber mat that is compressed in the direction of the thickness and an organic binder material that is homogeneously impregnated into the above described alumina fiber mat, and also that is eliminated by a thermal decomposition.

[0010]

By the use of the first inorganic fiber mat with the above described specific structure, in the case of the inorganic fiber formed body according to the present invention, at the time when it is used as a monolith support material, it does not become bulky and it demonstrates a significant effect such that it is stated that the attachment to the casing is easily achieved. And not only that but also, because of the fact that it is a material where on the high temperature side the crystalline alumina fiber made first inorganic fiber mat is placed, by that it is possible to eliminate the high temperature thermal deterioration of the subsequently placed second inorganic fiber mat. Then, regarding a preferred condition according to the present invention, it is the case when as the above described crystalline alumina fiber, a fiber with a mulite composition is used. By such a preferred condition, the inorganic fiber formed body according to the present invention is a material that at the time when it is used as a monolith support material, can even further prevent the high temperature thermal deterioration of the second inorganic fiber mat, and it is said to have demonstrated an effect of leading to an even more stable fixing of the monolith.

[0011]

Regarding the substrate material mat that forms the structure of the first inorganic fiber mat, it is an agglomeration of alumina fibers that have been layer laminated almost homogeneously in the direction of the thickness, and it also includes the so-

called blankets or blocks. As the alumina fibers, usually fibers that have a fiber diameter that is in the range of 1 ~ 50 microns, and a fiber length that is in the range of 0.5 ~ 500 mm, are used, however, from the point of view of the restoring force and the shape sustaining properties, it is especially preferred if the alumina fibers used have a fiber diameter that is in the range of 3 ~ 8 microns and a fiber length that is in the range of 0.5 ~ 300 mm.

[0012]

As the composition of the above described alumina fibers, it is an alumina - silica type crystalline material short fiber, and besides the alumina that has a silica content of no more than 5 weight %, namely, the high alumina material that contains at least 95 weight % or more alumina, there is also the usual material where the alumina is in the range of 70 ~ 95 weight %, and also, where the remaining structure is formed from silica. Especially, in the case of the mullite composition fibers where the alumina content is in the range of 72 ~ 85 weight %, it is a material that has excellent high temperature stability properties and elastic strength properties, and it is the preferred alumina fiber material.

[0013]

Regarding the crystalline alumina fiber, compared to the same alumina-silica type material that is non-crystalline (or amorphous), it has excellent thermal resistance properties, and similarly to the ceramic material fibers, it is a material that has an extremely little thermal deterioration like softening compression etc., and because of that, in the case when it is made into a compressed mat, it has ample elastic properties. Namely, it is stated that the mat has high supporting properties at low bulk density , and also that its thermal deformation is small. Consequently, because of the difference in the thermal expansion between the monolith (1) and the casing (2) that is manufactured from metal, the clearance between the monolith (1) and the casing (2) is changed, and even in the case when its bulk density is increased, there is no abrupt change of the supporting pressure relative to the monolith (1).

[0014]

As long as the organic binder is a material can support the compressed mat thickness under normal temperature conditions, and after it is eliminated by a thermal decomposition a restoration of the thickness of the above described mat is obtained, there are no particular limitations and such material can be used. However, it is necessary to prevent the use of organic binder materials that even at temperatures above the temperature of use are not decomposed, and especially, it is necessary to avoid the materials that by hinder the flexibility properties and the restored surface compression properties of the mat that is obtained by the impregnation of this organic binder, and it is necessary to avoid the use of organic binder materials that have such properties that they facilitate the destruction of the monolith (1). As the organic binder material, it is possible to use different types of rubber materials, water soluble macromolecular compounds, thermoplastic resin materials, thermosetting resin materials, etc.

[0015]

As the above described rubber type materials, there are the synthetic rubber materials: copolymer material obtained from ethyl acrylate and chloroethyl vinyl ether, copolymer material obtained from n-butyl acrylate and acrylonitrile, copolymer material obtained from ethyl acrylate and acrylonitrile, etc., acrylic rubber materials; nitrile rubber obtained from a copolymer material from butadiene and acrylonitrile, etc., butadiene rubber materials, etc.; as the water soluble organic macromolecular compounds, there are the carboxy methyl cellulose, polyvinyl alcohol, etc. As the thermoplastic resin materials, there are the acrylic type resins that are acrylic acid, acrylic acid ester, acrylamide, acrylonitrile, methacrylic acid, methacrylic acid esters, etc., homopolymers and copolymers; acrylonitrile - styrene copolymer materials; acrylonitrile - butadiene - styrene copolymer materials, etc. Also, as the thermosetting resin materials, there are the bis phenol type epoxy resins, the Novolac type epoxy resin etc.

[0016]

The water solution, water type emulsion, latex, organic solvent solution of the effective component of the above described organic binder material (here below called for short "binder solution"), are commercially available, and these binder solutions, in the state as they are or diluted with a solvent,

can be used, and because of that a relatively inexpensive price of their usage is obtained. Moreover, it is possible to use one type of these binders and also depending on the requirements it is possible to use a mixture of two materials.

[0017]
Among the above described organic binder materials, it is a preferred option if at least one type of materials is selected from the group of the acrylic rubber, nitrile rubber, carboxy methyl cellulose, polyvinyl alcohol and acrylic rubbers besides the acrylic resin materials, and especially, among the acrylic rubber materials, the nitrile rubbers, etc., synthetic rubber materials, the rubbers that have flexibility properties are especially effective.

[0018]
There are no specific limitations regarding the content of the organic binder material, and it is determined by the type and the shape of the fiber material that forms the structure of the mat, the absolute thickness of the mat, the thickness and the restoring force as a molded formed material containing the organic binder and prior to the assembly with the casing (2). Regarding the binder content, usually it is a good option if relative to 100 weight parts of the alumina fiber the effective component of the organic binder material is made to be within the range of 3 ~ 30 weight parts. In the case when the content of the organic binder material is made to be less than 3 weight parts, it is a case where it is not possible to support the thickness as a formed material by the mat regeneration, and in the case when the contained amount exceeds 30 weight parts, the cost is increased and beside that the flexibility properties of the molded material are lost. From this point of view, it is preferred that the above described organic binder proportion is in the range of 5 ~ 20 weight parts.

[0019]
The first inorganic fiber mat is manufactured by the technological process of the impregnation of the organic binder material into the mat, the technological process where the mat that has been impregnated by the organic binder solution is compressed in the thickness direction, the technological process where in the compressed state as it is, the solvent component of the organic binder solution is eliminated.

[0020]

Regarding the first inorganic fiber formed mat, it is preferred that it has the following here below characteristics. Namely, in the case when temporarily, the structure of the monolith support material is formed only from the first inorganic fiber mat, it is preferred that it is a material that has a restoring force in the range of 0.1 ~ 8.0 kgf/cm2 in the state when it is compressed to the thickness corresponding to the clearance between the outer peripheral surface of the monolith and the inner surface of the casing. Regarding this restoring force, when the monolith is manufactured from ceramic it is made to be in the range of 0.5 ~ 8.0 kgf/cm2, and in the case when the monolith is made from metal, it is made to be in the range of 0.1 ~ 4.0 kgf/cm2.

[0021]

Regarding the above described restoring force, it is demonstrated after the organic binder material that is homogeneously impregnated in the mat is eliminated by a thermal decomposition. regarding the restoring force of the mat, it corresponds to the force (compression force) that is necessary in order to compress the mat to the thickness that corresponds to the clearance between the outer peripheral surface of the monolith and the inner surface of the casing. Consequently, according to the present invention, the above described restoring force is defined by the compression force at the time of the formation of the mat.

[0022]

Regarding the second inorganic fiber formed mat (thermally expandable mat), it has a structure that is mainly formed from a mat obtained from ceramic fiber other than the above described, an inorganic expandable material that is homogeneously dispersed in the above described ceramic fiber mat and an organic binder material, that is homogeneously impregnated and that is also eliminated by a thermal decomposition. Then, regarding the above described second inorganic fiber mat, it functions as an expandable mat, the same way as the support material used in the catalyst converter that is described according to the Japanese Patent Application laid Open Number Hei-Sei 1-240715, and at the temperature region of relatively low temperatures of 600oC or less, it demonstrates excellent expansion properties.

[0023]

As the above described ceramic fiber, it is possible to use ceramic fibers other than the alumina type and the alumina - silica type, for example, alumino silicic acid salt fiber (materials with commercial names - fiber - flux, Cera fiber and Kao wool, etc.), asbestos fiber, glass fiber etc. And as the above described inorganic expandable material, it is possible to use hollow glass micro spheres, bentonite, expandable vermiculite, phlogopite (bronze mica), pearlite. expandable graphite, expandable

fluorinated mica, etc. And as the organic binder material, it is possible to use the same materials as in the above described.

[0024]

Regarding the used amount ratio of each of the above described components, they are set according to the following here below: ceramic fiber: 10 ~ 50 weight %, inorganic expandable agent: 20 ~ 65 weight %, organic binder material: 3 ~ 20 weight %. Also, regarding the formation of the mat, it is a material that can be obtained by using the well known spreading methods, and depending on the requirements, it is also a good option if the mat is formed by layer lamination of the sheets obtained by the spreading. Moreover, in the expandable mat, depending on the requirements it is also possible that as another inorganic filler agent, for example, sepiolite ore material etc., are also contained.

[0025]

According to the present invention, from the point of view of the effective elimination of the high temperature thermal deterioration of the second inorganic fiber mat (expandable mat), it is important that the thickness ratio of the thickness of the first inorganic fiber mat relative to the thickness of the total body of the inorganic fiber formed material, is set to be in the range of 20 ~ 80 %, and preferably in the range of 40 ~ 80 %. Namely, in the case when the thickness ratio of the first inorganic fiber mat is less than 20 %, it is a material whereby it is not possible to sufficiently eliminate the high temperature thermal deterioration of the second inorganic fiber mat (expandable mat). Also, in the case when the thickness ratio of the first inorganic fiber mat exceeds 80 %, it becomes difficult to conduct heat to the second inorganic fiber mat, and there is the anxiety that the expandable material of the above described second inorganic fiber mat would become insufficiently expanded.

[0026]

The first inorganic fiber mat and the second inorganic fiber mat in the inorganic fiber formed body according to the present invention, are materials that can be laminated as laminated layers for example by the following here below methods. i) the method where the fixed by the binder first and second inorganic fiber mats are glued and adhered by using an adhesive agent, ii) the method where on the top of the second inorganic fiber mat, the substrate mat, that is used as the first inorganic fiber mat, is laminated as a layer and after that, in the above substrate material mat an organic binder solution is impregnated, and then after that, it is compressed in the direction of the thickness, and then in the compressed state as it is the solvent of the organic binder solution is removed.

[0027]

According to the above described methods, by using an adhesive agent containing the above described organic binder, it is possible to form a structure where the two mats are adhered. Namely, according to the above described method, the same way as in the case of the used according to the previous technology stitch bonding, there is no bulkiness (high volume) and also, there is no destruction of the fibers of either mat, and as a result from that at the time when it is used as a monolith support it is possible to increase the installation properties, and also, it is possible to eliminate the decrease of the supporting force relative to the monolith.

[0028]

As it is shown according to Figure 3, in the case when the inorganic fiber formed body according to the present invention is used as a monolith support (3), in order to eliminate the distortion and displacement of the monolith support material (3) at the time of the assembly of the catalyst converter, as it is shown according to the presented in Figure 2, at the time when it is wrapped around the monolith (1), mutually grabbing like teeth bonding parts are provided on both edge parts in the direction of the wrapping. These bonding parts can be easily formed by a cutting off technological process etc. Moreover, in Figure 3, the symbol (30) denotes the first inorganic fiber mat, the symbol (31) represents the second inorganic fiber mat, the symbol (3) represents the monolith support material that uses the inorganic fiber formed body according to the present invention.

[0029]

Regarding the wrapping of the monolith support material (3), that is formed from the inorganic fiber formed body according to the present invention, around the monolith (1), it is done so that the first inorganic fiber mat (30) is positioned on the side of the monolith (1). Namely, by the positioning of the first inorganic fiber mat (30) on the side of the monolith (1), it is possible to eliminate the high temperature thermal deterioration of the second inorganic fiber mat (31).

[0030]

Regarding the catalyst converter according to the present invention, as it is shown according to the presented in Figure 1, in summary, it has a structure that is formed from the monolith (1) that is formed in a cylindrical shape and also that supports a catalyst material that is used for the purification of exhaust gases, the manufactured from metal casing (2), that houses the monolith (1) and also, that is connected to the exhaust gas pipelines, and the above described monolith support material (3), that is wrapped around the monolith (1) and that is placed in the clearance between the above described monolith and the casing (2).

[0031]

As the monolith (1), besides the monoliths that have a structure that is formed from

ceramics that have as their main component codeirrite etc., it is also possible to use monoliths that have a structure that is formed from a metal foil material. Especially, the ferrite type stainless steel foil, that has as its base components Fe, Cr, Al or Si, is a preferred material for the structure of the monolith made from a metal material because it has good compatibility with the coating material and the catalyst at the time when it is supporting the catalyst material, and not only that, but also, because it has a relatively small thermal change after the support of the catalyst material. In the monolith (1), usually, Pt, Ph etc., precious metal layers are supported and by that the function as a catalyst is imparted.

[0032]

Regarding the casing (2), it is provided with 2 part clam shell structure that is combined in one body as the two parts, the casing part (2a), that forms the structure of the upper half of the above described casing and the casing part (2b), that forms the structure of the lower half part, are combined. The casing part (2a) and the casing part (2b) each, have the flange parts (21a) and (21b), and these flange parts (21a) and (21b), function as the bonding surface at the time of the joining of the casing part (2a) and the casing part (2b). Also, on both edge parts of the casing part (2b) that is on one side, the connection openings (4) and (5) are provided that are used for the connection to the exhaust gas transport pipe. In Figure 3, the symbols (22a) and (22b) represent the bolt openings for fixing onto the automobile body etc., of the automobile. Moreover, as the metal manufactured casing, it is also possible to advantageously use the casing that has a stuffing structure where the monolith that has been formed in advance into a cylindrical shape has been inserted.

[0033]

In the case when in the casing (2) the monolith (1) is contained, it is not necessary that the monolith support (3) has the same thickness as the clearance that is formed between the outer peripheral surface of the monolith (1) and the inner surface of the casing (2), and even if it is slightly thicker it can be installed. However, in the case when the thickness is too large or the slipping properties of the casing are poor, one part of the fibers of the monolith support material (3) are protruding from the bonding surface of the flange parts (21a) and (21b), and unfavorable conditions are generated such that the bonding becomes impossible, etc., and because of that its thickness is set to be in the range of 1.0 ~ 2.0 times the above described clearance. Regarding the upper limit of this defined value, preferably, it is made to be 1.7 times, and especially preferably, it is made to be 1.6 times the clearance size.

[0034]

The catalyst converter according to the present invention is mainly used in the exhaust gas pipelines of automobiles. And in the case of the catalyst converter according to the present invention, at the time when the high temperature gases from the internal burning engines pass through, the temperature of the monolith

(1), the casing (2) and the monolith support (3) is increased, and the organic binder material that is impregnated in the first inorganic fiber mat (30) and the second inorganic fiber mat (31) is eliminated by a thermal decomposition, and the restoring force of the first inorganic fiber mat (30) is demonstrated and together with that the second inorganic fiber mat (31) expands its volume because of the expansion of its inorganic expandable material. Namely, the monolith (1) is fixed by the restoring force of the thickness of the first inorganic fiber mat (30) and by the volume expansion of the second inorganic fiber mat (31).

[0035]

Also, according to the present invention, the monolith support material (3) is wrapped so that the first inorganic fiber mat (30), that has excellent thermal resistance properties, is placed on the side of the monolith (1), and because of that, it is possible to effectively eliminate the high temperature thermal deterioration of the second inorganic fiber mat (31) of the monolith supporting material (3), and it is possible to sufficiently maintain the surface pressure relative to the monolith (1) following the change of the clearance between the outer peripheral surface of the monolith (1) and the inner surface of the casing (2), that is obtained based on the temperature changes. Especially, as it has been described here above, because in the case of the monolith supporting material (3), there is no damage to the fibers, there is no decrease of the supporting force relative to the monolith (1), and an even more stable fixing of the monolith (1) is achieved.

[0036]

[Results from the present invention]

As it has been explained here above, in the case of the inorganic fiber formed body according to the present invention, at the time when it is used as a monolith support material, it presents a significant effect in that it is said that the installation to the casing is easily conducted. And not only that but also, by the crystalline alumina fiber mat it is possible to eliminate the high temperature thermal deterioration of the ceramic fiber mat that is on the outer periphery side, and it is possible to achieve a stable fixing of the monolith. Then, because there is no destruction of the fibers, there is no decrease of the supporting force relative to the monolith, and the effect is obtained such that it is said that an even more stable fixing of the monolith is achieved. Also, in the case of the catalyst converter according to the present invention, because of the use of the above described inorganic fiber formed body, the effect is obtained such that it is said that the assembly becomes easy and also, the monolith fixing is stable.

[Simple explanation of the figures]

[Figure 1]

Figure 1 represents a three dimensional view diagram in an assembly state showing the structure of the catalyst converter.

[Figure 2]

Figure 2 is a three dimensional view diagram showing the wrapping outline of the monolith support material relative to the monolith.

[Figure 3]

Figure 3 is a three dimensional view diagram showing part of the monolith support material that has a structure that is obtained from an inorganic fiber formed body.

[Simple explanation of the signs]

1.....monolith
2.....casing
2a.....casing part (upper half part of the metal manufactured casing)
2b.....casing part (bottom half part of the metal manufactured casing)
21a.....flange part
21b.....flange part
3.....monolith supporting part
30.....first inorganic fiber formed mat
31.....second inorganic fiber formed mat
4.....bonding opening (entrance)
5.....bonding opening (exit)

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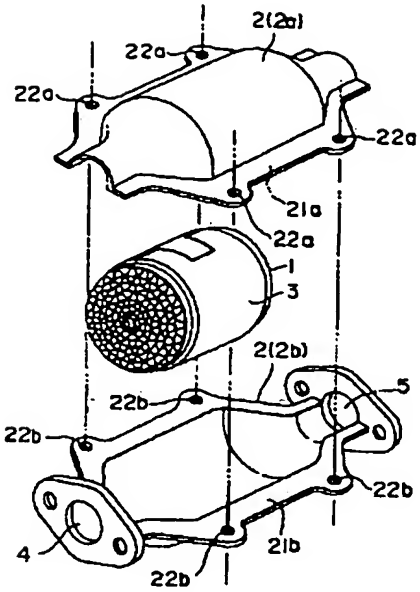
1/24/99

【図1】



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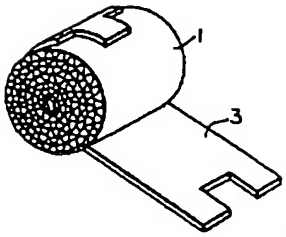

【図3】